Public Health Reports

Vol. 55 • NOVEMBER 15, 1940 • *No. 46*

UNIT ON GERONTOLOGY IN THE NATIONAL INSTITUTE OF HEALTH

The National Institute of Health of the United States Public Health Service is organizing a new unit for research into some of the many problems of aging. With the conspicuous shift to greater age in the population, senescent individuals are becoming increasingly significant in the national economy and defense. Preventive medicine must attack the practical problems of the rising proportion of deaths attributable to diseases of middle and later life and energetically attempt to augment the health and vigor of those past the meridian. Aging is a continuous biologic phenomenon which starts upon creation of a new individual and continues at variable rates until death. The problems of aging (gerontology) are not limited to the diseases of the aged (geriatrics), for the latter are the consequences of senescence. In man probably the most significant period of life for gerontologic study is late maturity, approximately the two decades between 40 and 60.

The problems of aging are logically divisible into three major fields of investigation: (1) The biology of senescence as a process, (2) the human clinical problems of aging and of diseases characteristically associated with advancing years which include the mental changes of senescence and senectitude as well as the physical changes, and (3) the socio-economic problems of a shifting age distribution in the population. The National Institute of Health is concerned with the first two of these divisions of the science.

In order to advise this new unit, there has been formed a National Advisory Committee on Gerontology, representative of the scientific thought of the Nation. The membership of this Advisory Committee includes:

Dr. L. R. Thompson, Director, National Institute of Health, U. S. Public Health Service.

Dr. Anton J. Carlson, Physiologist, University of Chicago, National Research Council.

Dr. Charles L. Christiernin, Association of Life Insurance Medical Directors of America; Medical Director, Metropolitan Life Insurance Co.

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Dr. Robert A. Coker, Zoologist, University of North Carolina.

Dr. William Crocker, Botanist, Boyce Thompson Institute of Plant Research.

Mr. Lawrence K. Frank, Sociologist, Josiah Macy, Jr., Foundation.

Dr. A. Baird Hastings, Biochemist, Harvard University.

Dr. Ludvig Hektoen, Pathologist; Consultant, National Cancer Institute, U. S. Public Health Service.

Dr. Winfred Overholser, Psychiatrist; Superintendent, St. Elizabeths Hospital.

Dr. Clarence Selby, Industrial Physician, General Motors Corporation.

Dr. William D. Stroud, Clinician, Philadelphia, Pa.

The first service to scientific research which the Unit on Gerontology is undertaking is to conduct a survey of the present trends of active and contemplated investigations into the problems of aging in American scientific institutions. This survey is intended to ascertain just what problems are being studied and what methods of approach are being applied. There is no desire to learn, in advance of publication, the data being developed in these specific undertakings.

In addition to these studies, many investigations which do not pertain directly to aging should yield data useful to workers in gerontology. The Unit on Gerontology is especially interested in knowing of these indirectly related studies, the full implications of which are far too often obscured in their published titles.

Inquiries about studies related to aging are being sent to scientists in the basic biologic sciences as well as to clinical investigators, for much fundamental work upon the processes, mechanisms, and consequences of senescence is probably going on in the sciences of botany, zoology, physiology, pharmacology, psychology, etc. From the clinical viewpoint, our greatest concern is with those studies dealing with health evaluation, mensuration of functional capacity (including criteria of "physiologic age") and with those diseases whose incidence increases sharply in later life (the so-called "degenerative disorders").

Critical analysis of the information elicited by such a survey may be expected to serve several valuable purposes. It should assist in bringing together in closer cooperation investigators interested in related problems, especially when widely divergent methods of approach are being utilized. The survey will likewise emphasize the urgent need for greatly augmented support for significant studies of these vitally important problems of senescence.

The broad and general pattern of the problems being investigated will undoubtedly reveal a number of neglected "blank spots" which may justify special emphasis in the future. Analysis of the data of the survey will also be an invaluable aid in formulating future re-

search programs, both at the National Institute of Health and elsewhere.

From preliminary inquiries it is observed that there is a great but largely latent and scattered interest in the problems of aging. It is the hope of the Unit on Gerontology of the National Institute of Health that the present survey may serve to aid effectively the promotion of closer cooperation of the scientists interested in these fields.

Information concerning subjects under investigation and the methods of approach is earnestly solicited. Letters should be addressed to Dr. Edward J. Stieglitz, In Charge, Investigations in Gerontology, National Institute of Health, U. S. Public Health Service, Bethesda, Md.

STUDIES OF THE ACUTE DIARRHEAL DISEASES [1]

IV. AN OUTBREAK OF BACILLARY DYSENTERY DUE TO THE "NEWCASTLE DYSENTERY BACILLUS"

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In the preceding communication *(1)* in this series of reports, the literature relative to the "Newcastle dysentery bacillus" was reviewed and all reported cases were noted. Apart from multiple infections in households only one small outbreak has been recorded. In a home for crippled children Clayton and Warren *(2)* observed 12 cases among "the more weakly members of the community." The present report concerns an outbreak in a hospital in New York City. There were 97 clinical cases. Those affected were healthy young adults, chiefly nurses. In 77 (79.4 percent) the diagnosis was established by isolation of the "Newcastle dysentery bacillus." Twenty-three healthy carriers were also detected.

CLINICAL NOTES

The nurses in the hospital customarily reported even minor illnesses and were promptly seen by a physician. For this reason most of the

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This is the fourth in a series of papers on the acute diarrheal diseases. Other papers in this series are: I. Differential culture media. By A. V. Hardy, James Watt, T. M. DeCapito, and Maxwell H. Kolodny. Pub. Health Rep., 54: 287–300 (1939); II. Parasitological observations. By Bertha K. Spector, A. V. Hardy, and Mary Graham Mack. Pub. Health Rep., 54: 1105–1113 (1939); III. Infections due to the "Newcastle dysentery bacillus." By A. V. Hardy, James Watt, Maxwell Kolodny, and T. M. DeCapito. Am. J. Pub. Health, 30: 53 (1940).

patients in the outbreak were under medical care and isolated soon after the onset of the symptoms. Occasionally there was delay, since a few individuals concealed their symptoms in the hope of avoiding surveillance. Sixteen who were very mildly ill did not come under observation until they were later found to have positive stool cultures. In view of the unusual nature of the outbreak, the symptoms were observed with particular interest by the nurse-patients, and fully recorded by the physicians in charge.

TABLE 1.—*Prominent symptoms and findings in 97 cases of acute diarrhea due to the "Newcastle dysentery bacillus"*

Symptoms and findings	Number of cases	Percent of total	Symptoms and findings	Number of cases	Percent of total
Diarrhea	97	100	Weakness	38	39
Abdominal pain	85	88	Anorexia	35	36
Fever	76	78	Malaise	29	30
Headache	68	70	General aching	26	27
Nausea	59	61	Abdominal tenderness	19	20
Chilliness	46	47	Mucus in stool	16	16
Vomiting	43	44	Blood in stool	10	10
Backache	41	42	Rigor	8	8

The symptoms and findings as abstracted from the hospital records and supplemented to a limited extent by individual inquiries are summarized in table 1. Diarrhea of some degree, usually mild, occurred in all cases; this was almost always associated with griping pains. The number of stools was recorded in 84 cases. On the day of the most severe symptoms 60 patients had between 4 and 9 stools, 11 had between 10 and 19, and 3 patients had more than 20 stools. Commonly the stools were watery; mucus was noted in 16 of the cases and gross blood in 10; the latter appeared infrequently and in small amounts. The bloody mucoid discharges of bacillary dysentery, as the disease is usually described, were strikingly absent. Nausea, vomiting, anorexia, weakness, and malaise were all quite common complaints, but were rarely prominent. The symptoms usually most in evidence were those ordinarily associated with acute febrile disorders. These included headache, backache, general aching and chilliness, and the rarer but more impressive true rigors, which occurred in 8 cases. Temperature records were available in 79 cases. The maximum oral temperatures were:

99°– 99.9° in 6 cases
100°–100.9° in 17 cases
101°–101.9° in 19 cases
102°–102.9° in 10 cases
103°–103.9° in 13 cases
104°–104.9° in 12 cases
105°–105.9° in 2 cases

There were prominent signs of meningeal irritation in 3 cases and in 6 the spleen was easily palpable. In one case the clinical appear-

ances suggested appendicitis superimposed upon bacillary dysentery.

Clinical laboratory tests were performed in approximately one-half of the cases. The total white blood cells and the proportion of polymorphonuclear leucocytes were often increased. In some instances the feces contained blood and pus in microscopic quantities only. The guaiac test was performed on stools of 22 individuals who had reported no gross blood; in 9 it was strongly positive, in 7 weakly positive, and in 6 entirely negative.

In its usual course the illness had an abrupt onset followed by moderately severe symptoms for 2, 3, or 4 days, and a period of convalescence of about the same duration. As shown in table 2 the illness was more prolonged in some cases. Two patients were acutely ill for more than 2 weeks; at the end of 1 month 3 were still convalescing in the hospital. All cases terminated in complete recovery.

TABLE 2.—*Duration of illness in cases of acute diarrhea due to the "Newcastle dysentery bacillus"*

Duration of illness in days	Number of cases		Duration of illness in days	Number of cases	
	From onset to termination of acute symptoms	From onset to complete convalescence		From onset to termination of acute symptoms	From onset to complete convalescence
1	14	9	10	1	1
2	19	6	11	0	0
3	18	5	12	1	0
4	22	10	13	0	2
5	6	11	14 and over	2	5
6	6	9	Not recorded	4	4
7	1	19			
8	2	9	Total	97	97
9	1	7			

The clinical features of these cases differed somewhat from those observed in endemic Flexner and Sonne infections. In the latter the predominant symptoms were diarrhea and abdominal pain. The temperature was often elevated, but backache, general aching, and chilliness were uncommon, and in uncomplicated cases in adults rigors were not seen. The symptoms in the Newcastle infections also differed notably from those in a comparable outbreak due to *Salmonella typhi murium* in which diarrhea was severe, nausea and vomiting persistent, and abdominal tenderness and rigidity marked. These clinical variations, apparent in the study of groups of cases were, however, neither of a type nor a degree which would permit reliable differential diagnosis in individual cases.

LABORATORY OBSERVATIONS

Bacteriology.—In the study and control of this outbreak more than 4,000 fecal specimens were examined. The early bacteriological

diagnoses were made in the laboratory at the hospital. The health department received the later diagnostic and the early release specimens, and almost all those collected from healthy individuals. At the laboratory of the DeLamar Institute attention was given chiefly to the final release specimens and to the detailed identification of all suspicious organisms isolated in the three laboratories. It was the practice to study in detail only one or two of the suspicious organisms from each individual and to rely on serological identification of other isolations from the same person, provided the findings remained consistent throughout. The detailed studies were extended when it seemed possible that more than one variety of *Shigella* had been isolated from the same individual. The identification of the organisms as the "Newcastle dysentery bacillus" was made on the basis of the cultural and serological characteristics described in the preceding paper of this series (*1*). As is true of almost all Newcastle organisms isolated in this country, these were of the nongas-forming, mannitol fermenting variety.

The media regularly employed in examining the fecal specimens were not the same in the three laboratories, but included Endo's, MacConkey's, and the two desoxycholate agars, either singly or in combinations. The results obtained at different periods and by varying techniques are shown in table 3.

TABLE 3.—*Bacteriological observations on fecal specimens collected from cases at different periods and examined by varying techniques*

Date specimen collected	Stools cultured on Endo's or MacConkey's agar			Stools cultured on MacConkey's and the desoxycholate agars		
	Number examined	Positive for "Newcastle"		Number examined	Positive for "Newcastle"	
		Number	Percent		Number	Percent
June 23–26	58	45	78	0	----------	----------
June 27–28	57	45	79	0	----------	----------
June 29–30	74	48	65	48	37	77
July 1–2	72	11	15	0	----------	----------
July 3–4	160	7	4			
July 5–6	111	4	4	85	16	19
July 7–8	58	2	3			
July 9–21	107	0	0	40	5	13

The infection was probably spread on June 20 and clinical symptoms followed in 1 to 3 days. The very high proportion of successful isolations from the diagnostic specimens collected up to June 30 was striking. During this period 237 specimens were tested and 175 (74 percent) yielded the Newcastle bacillus; the Endo and MacConkey plates commonly showed little growth other than the suspicious colorless colonies. Under these circumstances one would expect little advantage from a medium designed to receive a heavy fecal inoculum, and on

June 29 and 30 only a slightly greater yield of positive results was obtained through the use of such a preparation. Later when there were relatively few suspicious colonies, the coli-inhibiting medium yielded distinctly superior results. During the period July 3 to July 8, 4 percent of the earlier release specimens were positive when examined using Endo or MacConkey plates. When the desoxycholate citrate agar was included, 19 percent of positive cultures were found in a series of release specimens obtained from persons who had already had two negatives on Endo's agar. Most of these isolations and all of the later ones were made from the desoxycholate citrate only. The five isolations on this medium after July 8 were all on cases which had had four or more negative cultures on Endo's or MacConkey's medium. Thus when convalescent carriers were studied by means of a coli-inhibiting media, the results were very different from those based on the exclusive use of less selective media.

Among those who considered they had been free of symptoms, 23 carriers of Newcastle bacilli were found. Excepting a few food handlers the stool cultures on persons not ill were started on June 28 and continued through the first week of July. Endo's agar was used routinely. Since many of the positive cases had become negative before the latter examinations were completed and since the technique employed was not the most effective for the detection of convalescent carriers, the 23 known healthy carriers probably represent only a portion of those actually present.

Some evidence was obtained as to the duration of the infection in the cases observed. It was assumed that an individual harbored the organism continuously from exposure until the date of the last successful isolation. Of the 77 positive cases 73 yielded the organism on or after June 27, 1 week following exposure and after the subsidence of acute symptoms in almost all positive cases. Thus it is evident that in the majority of those who acquired symptoms the infection was maintained consistently for 1 week. During the first half of the second week there was still evidence of heavy infection but in the latter half the cases rapidly became negative and the infections were relatively light. At the end of the second week after exposure 21 cases remained positive. One week later this number had fallen to 4. At the end of 4 weeks the organism was isolated from only 3 cases and at the end of 31 days no positive cases were found. The disappearance of the organisms did not seem to have a direct relation to the subsidence of clinical symptoms. Individuals with prolonged illnesses had negative cultures prior to complete recovery whereas mild cases of short duration often continued to yield positive cultures for several days following convalescence. The data relative to the duration of the carrier state in those who had had no symptoms were inconclusive.

Carriers of other varieties of pathogenic *Shigella* were strikingly rare. A Flexner organism was repeatedly isolated from one individual and from another a dispar strain. Typical Sonne organisms were not detected. The nonpathogenic *Shigella alkalescens* was found frequently.

Serology.—Blood for serological examination was collected during the third week after the probable date of exposure. Specimens were obtained from 77 cases and 14 carriers and for control purposes from 34 other nurses or employees who had several stool cultures negative for the "Newcastle dysentery bacillus." One hundred sera from the Wassermann laboratory of the New York City Department of Health were also used as controls. Six months later blood was again drawn from available cases and carriers whose serum had shown significant agglutination of the Newcastle organism.

The antigens employed in the tests were saline suspensions of approximately 600,000,000 living organisms per cubic centimeter, comparable in turbidity to tube 2 of McFarland's nephelometer. These antigens were prepared from smooth strains which had been transferred repeatedly. Six organisms were used. These included three strains of the "Newcastle dysentery bacillus," the gas-producing variety from the Bureau of Standards Laboratory, Oxford, England, a nongas-producing strain isolated during the outbreak, and the homologous organism when available. The other three organisms used were *Shigella dysenteriae* Flexner Y, obtained from the Bureau of Standards Laboratory, Oxford, England, *Shigella dysenteriae* Sonne and *Salmonella schottmülleri* (group phase), both from the laboratory of the New York City Department of Health. The 100 control Wassermann sera were set up with only one of the Newcastle antigens, that prepared from the type strain obtained from England. Throughout, six serum dilutions were used in the range from 1 to 10 to 1 to 320 inclusive. The tests were held in the waterbath at 56° C. for 4 hours and at a room temperature until read at the end of 20 to 24 hours.

Findings were recorded as totally negative or as positive in one of four degrees. The 4 plus reading signified complete clearing and moderately large persisting clumps, the 3 plus was similar except with slight turbidity of the supernatant fluid, 2 plus indicated a little clearing with definite clumping, and the 1 plus little or no clearing and only small clumps. For simplicity in tabulation we included the 3 and 4 plus in one group designated "complete agglutination" in a specified titer. In those tests with "complete agglutination" we disregarded any 1 or 2 plus readings. The tests which gave nothing more than a 1 or 2 plus reaction in any dilution were designated in the tables as "partial agglutination." Specimens with "no agglutination" were totally negative in all serum dilutions employed.

The titers obtained with the three Newcastle organisms were relatively uniform. The homologous organisms showed some tendency to yield lower readings, probably due to the fact that these organisms had not been transferred as frequently as the other two. In the tables we have shown only the readings on the Oxford strain of the "Newcastle dysentery bacillus."

In table 4 the observations on cases, carriers, and controls for each of the four organisms are shown. Of the 64 cases positive bacteriologically, 5 (7.8 percent) failed to show any agglutination, and 12 (18.7 percent) yielded only partial agglutination. Of the 47 (73.5 percent) cases which gave "complete agglutination," the maximum titer was 1:10 or 1:20 in 11 (17.2 percent), but was 1:40 or above in 36 (56.3 percent). These results are to be compared with the 134 controls which had no complete agglutination in titers of 1:40 or above; only 1 was positive in 1:20 and 2 in 1:10. The more frequent occurrence of partial agglutinations in the hospital controls suggests that some of these may have had transient contact with the Newcastle organisms. The cases negative bacteriologically presumably had a less prolonged exposure to the Newcastle organisms than did those positive bacteriologically. It may also be assumed that carriers tend to have a less intimate contact with the organisms than do cases. For these reasons it would be expected, as was found, that the titers on the negative cases and carriers would be less than on the positive cases. The two cases negative bacteriologically with the higher titers both had relatively severe and prolonged illnesses. The one carrier with a titer of 1:160 was found on special inquiry to have had suggestive symptoms "when the others were becoming ill."

It has repeatedly been observed that Flexner strains are not infrequently agglutinated in titers up to 1:40 by the serum of normal individuals. Occasionally, as in this series, higher titers are found. The sera from the Newcastle cases agglutinated *Shigella dysenteriae* Flexner Y in higher titers than the control sera. It is believed that this is the result of a common antigenic fraction, as has been suggested by Boyd (*3*). In contrast, the *Shigella dysenteriae* Sonne and the *Salmonella schottmülleri* were rarely agglutinated, as is shown in the table.

After an interval of 6 months second specimens of blood were obtained from 37 of the cases or carriers who had the higher titers on the original examination. The early and the late findings are shown in table 5. It is evident that in 6 months or less the agglutinins for the Newcastle organisms which were developed almost entirely disappeared.

TABLE 4.—*Agglutination reactions in the sera of cases, carriers, and healthy controls*

Antigen	Groups tested	Number examined	No agglutination		Partial agglutination		Complete agglutination		Number with complete agglutination in maximum titers of:					
			Number	Percent	Number	Percent	Number	Percent	1:10	1:20	1:40	1:80	1:160	1:320
"Newcastle dysentery bacillus."	Cases positive bacteriologically	64	5	7.8	12	18.7	47	73.5	8	3	22	9	5	0
	Cases negative bacteriologically	13	8	61.5	1	7.7	4	30.8	1	0	1	0	1	1
	Carriers	14	8	57.1	1	7.2	5	35.7	1	2	1	0	1	0
	Hospital controls	34	27	79.4	6	17.7	1	2.9	1	0	0	0	0	0
	City controls	100	92	92.0	6	6.0	2	2.0	1	1	0	0	0	0
Shigella dysenteriae Flexner Y.	Cases positive bacteriologically	64	17	26.7	21	32.7	26	40.6	9	3	8	5	1	0
	Cases negative bacteriologically	13	4	30.8	5	38.4	4	30.8	1	1	0	1	1	0
	Carriers	14	6	42.9	5	35.7	3	21.4	1	0	1	1	0	0
	Hospital controls	34	22	64.8	6	17.6	6	17.6	3	1	1	0	1	0
	City controls	100	69	69.0	12	12.0	19	19.0	7	7	4	1	0	0
Shigella dysenteriae Sonne.	Cases positive bacteriologically	59	52	88.1	6	10.2	1	1.7	1	0	0	0	0	0
	Cases negative bacteriologically	11	10	91.0	0	0	1	9.0	1	0	0	0	0	0
	Carriers	9	9	100	0	0	0	0	0	0	0	0	0	0
	Hospital controls	31	31	100	0	0	0	0	0	0	0	0	0	0
	City controls	100	95	95.0	4	4.0	1	1.0	1	0	0	0	0	0
Salmonella schottmülleri (group phase).	Cases positive bacteriologically	64	54	84.4	6	9.4	4	6.2	1	2	1	0	0	0
	Cases negative bacteriologically	13	12	92.3	1	7.7	0	0	0	0	0	0	0	0
	Carriers	14	11	78.6	3	21.4	0	0	0	0	0	0	0	0
	Hospital controls	34	33	97.0	1	3.0	0	0	0	0	0	0	0	0
	City controls	100	100	100	0	0	0	0	0	0	0	0	0	0

The major significance of these serological observations is in establishing with relative certainty the etiological role of the Newcastle organisms in this outbreak. It appears also that the complete agglutination of this organism in titers of 1:40 or above has diagnostic value in the examination of New York City residents.

TABLE 5.—*Comparison of the agglutination titers for the "Newcastle dysentery bacillus" in 37 cases and carriers who were examined 3 weeks following exposure and 6 months thereafter*

Date examined	Number examined	Number of cases						
		No agglutination	Maximum titers with complete agglutination					
			1:10	1:20	1:40	1:80	1:160	1:320
July 1939	37	0	6	1	18	6	6	0
January 1940	37	34	2	1	0	0	0	0

EPIDEMIOLOGY

The institution.—The hospital in which the outbreak occurred is an institution widely known for the excellence of its physical plant and the high qualifications of its medical and administrative staffs. The private pavilion and nurses' residence are separated from the main hospital. Each of these divisions has an independent kitchen with adjoining dining rooms. All foods are purchased in common and dispensed from a central supply, but, with the exception of bread and pastries, are prepared in the three separate kitchens. In addition to the latter, there is also a diet kitchen for the preparation of special menus, and a kitchen for the pediatric service.

Onset.—The chronological record of the outbreak is shown in table 6. Most of the illnesses began during the 3 days from June 21 to 23, inclusive, though in a few instances the onset was slightly later. One is also recorded for June 20 but the history in this case was subject to error. The individual was admitted to the hospital on July 2 after a positive stool culture, and only then reported mild and transient symptoms. The close grouping of the dates of onset in a disease with a relatively short incubation period strongly suggests that all exposures took place within a very limited period of time. The lag in making examinations and bringing cases and carriers under control is clearly evident in the table.

Distribution.—The hospital populations, shown in the first column of table 7, were determined from available records. The individuals examined included not only those present on the census day, June 20, but also those who entered the service subsequently. Thus members of the house staff who began their service on July 1 were cultured as well as those present earlier. The findings lack comparability in one

respect, that is, the nurses and the food handlers were examined first, while the other staff and employee groups and the hospital patients were not examined until the early days of July. At this time the positive findings among the nurses were decreasing. Despite this known difference in the time of stool examination the findings appear definitely to have localized the outbreak to the nurses' residence. All cases were among those who regularly ate food prepared in the nurses' kitchen; of the 23 carriers of the Newcastle organism only 3 were regularly served from other sources and one of them was clearly a contact infection.

TABLE 6.—*Chronological relationships in the outbreak*

Date	Clinical cases			Carriers	
	Onset	Admission to hospital	First stool culture	First stool culture	Isolated
June 20	1	0	0	0	0
21	12	0	0	0	0
22	43	9	0	0	0
23	26	43	16	0	0
24	6	10	17	0	0
25	7	9	3	0	0
26	2	8	7	0	0
27	0	2	3	4	0
28	0	0	20	9	0
29	0	2	22	6	0
30	0	9	3	2	4
July 1	0	1	1	1	6
2	0	3	3	0	3
3	0	0	2	0	6
4	0	0	0	0	1
5	0	0	0	1	1
6	0	0	0	0	0
7	0	1	0	0	1
Total	97	97	97	23	[1] 22

[1] 1 carrier was never isolated in the hospital.

The suspected cases considered in the last column of table 7 were, with few exceptions, individuals kept under observation on the basis of the isolation of an organism which gave a positive reaction on Russell's medium. They were released when specific Newcastle antiserum failed to agglutinate the organism. Most of these proved to be *Shigella alkalescens*. A few persons were isolated and observed for a diarrheal disorder which in most instances had its onset during or shortly after the Fourth of July holiday. The general distribution of these suspected cases is in striking contrast to the close grouping of the Newcastle infections.

In addition to the nursing group which was chiefly involved there were cases and carriers among the dietitians and anesthetists who lived and ate in the nurses' home. The nurse aides came to the nurses' home for meals only; 3 of the 40 were infected. Among the kitchen staff no cases or carriers were found, except the dietitian who ate her meals in the supervisors' dining room. An elevator operator who worked and ate in the nurses' residence became ill.

A group of 28 maids and porters worked in the nurses' quarters but obtained meals in the main employees' cafeteria. None of these persons became ill. Among the 25 examined, with the average of two tests per person, no carrier was found.

TABLE 7.—*Distribution of infection among groups obtaining food from different sources*

Source of food	Patients and staff as of June 20, 1939	Individuals examined	Positive for "Newcastle"		Clinical cases negative bacteriologically	Total infected	Attack rate, percent	Suspected cases	
			Cases	Carriers				Number	Attack rate, percent [1]
A. Main kitchen:									
Patients, semiprivate and ward	474	142	0	0	0	0	0	12	8.5
Officers	30	0	0	0	0	0	0	0	0
House staff	65	73	0	0	0	0	0	3	4.1
Social workers	61	11	0	0	0	0	0	2	18.2
Clerks	145	49	0	0	0	0	0	2	4.1
Employees' cafeteria	290	190	0	1	0	1	.5	8	4.2
B. Private pavilion:									
Patients	103	20	0	0	0	0	0	0	0
Nurses	165	178	0	0	0	0	0	11	6.2
Kitchen help	20	23	0	2	0	2	8.7	2	9.5
C. Children's kitchen	63	0	0	0	0	0	0	0	0
D. Nurses' residence:									
Supervisors	28	29	3	2	0	5	17.2	1	4.2
Head nurses	83	85	5	2	1	8	9.4	5	6.5
Cafeteria	364	340	67	14	19	100	29.4	14	5.8
Help and nurse aides	88	84	2	2	0	4	4.8	3	3.8
E. Outside hospital and unidentified by occupation		224	0	0	0	0	0	3	1.3
Total	1,979	1,448	77	23	20	120	8.3	66	5.0

[1] Computed on basis of number examined exclusive of known cases or carriers.

Three carriers of the Newcastle bacillus had no known contacts with the nurses' residence. Two were employed in the private pavilion as cook and dishwasher, respectively. The third worked in the laundry and received her meals from the main kitchen. She was admitted to the isolation ward as a suspected positive. The first organism isolated in her case was subsequently found to be *Shigella alkalescens*. After four more stool examinations which were negative for Newcastle she then had one positive. As she had been placed in a ward with known infected cases, this was assumed to be a secondary contact infection.

Possible modes of dissemination.—Certain possible channels of dissemination could be eliminated. There was no common social event which included those infected. No evidence could be found to incriminate water. Those who ate elsewhere but worked in the nurses' home and drank the water there did not become infected. Moreover, examination of the water supply revealed no evidence of a source of pollution which would remain limited to one part of the institution. The ice used for all purposes was manufactured in the hospital and was distributed to all divisions. Likewise the food as purchased could

scarcely be suspected since it was distributed to all the kitchens and similar menus were used throughout. Therefore, it seemed evident that if the disease was spread by food, the food must have been contaminated while it was being prepared in the kitchen of the nurses' home.

TABLE 8.—*Attendance at meals in the nurses' dining rooms during the days of possible spread of the infection*

Day, date, and meal	Cases			Carriers			Controls		
	Records obtained	Meals in		Records obtained	Meals in		Records obtained	Meals in	
		Number	Percent		Number	Percent		Number	Percent
Thursday, June 15:									
Breakfast	67	48	72	13	9	69			
Dinner [1]	67	65	97	13	9	69			
Supper	67	57	85	13	8	62			
Friday, June 16:									
Breakfast	67	49	73	13	10	77			
Dinner [1]	67	64	95	13	9	69			
Supper	67	58	87	13	8	62			
Saturday, June 17:									
Breakfast	67	47	70	13	10	77			
Dinner [1]	67	63	94	13	9	69			
Supper	67	52	78	13	6	46			
Sunday, June 18:									
Breakfast	67	34	51	13	10	77			
Dinner [1]	67	51	76	13	6	46			
Supper	67	37	55	13	6	46			
Monday, June 19:									
Breakfast	93	74	80	17	13	76	213	151	71
Dinner [1]	93	91	98	17	11	65	213	187	88
Supper	93	80	86	17	8	47	213	154	72
Tuesday, June 20:									
Breakfast	93	75	81	17	12	71	213	149	70
Dinner [1]	93	92	99	17	11	65	213	186	87
Supper	93	81	87	17	7	41	213	153	72
Wednesday, June 21:									
Breakfast	93	72	77	17	11	65	213	151	71
Dinner [1]	93	86	91	17	9	53	213	183	86
Supper	93	72	77	17	6	35	213	149	70

[1] Includes those served the same foods at noon and midnight.

Detailed evidence was collected relative to the possible spread of the infection by foods served in the nurses' residence. A preliminary survey indicated that several individuals who later became ill were absent from meals on Sunday, July 18, and one person did not go on duty until Monday, July 19. Information as to meals taken in the hospital from June 15 to 18 was collected from 67 of the nurses who became ill and 13 carriers; however, for the 3 days, Monday, June 19, through Wednesday, June 21, data were obtained from almost all the cases, carriers, and uninfected individuals possibly exposed. The findings are shown in table 8. It is evident that many did not have breakfast in the dining rooms and that absence from the evening meal was relatively common. Therefore, if the infection was spread by food, only that which was served at the midday and midnight meals could be responsible. The same food was prepared in common for these, that for the night meal being heated, when necessary, and served

in individual dishes immediately prior to consumption. This menu alone was used by most of those who became ill. Two of the subsequent cases were absent from dinner on Monday, June 19. Only one individual said that, though she could not recall positively, she believed that she had been out for dinner on Tuesday, June 20. Six ate elsewhere on Wednesday, June 21. Among the carriers, absence from meals was more common, as is shown in the table. It is evident that breakfast or supper could scarcely be incriminated, but food served Tuesday noon or midnight is known to have reached all or all but one of those who developed symptoms, while on Monday two, and on Wednesday six of the subsequent cases were absent.

These meals were suspected early and verbal inquiry was then made as to foods consumed. The detailed data given in table 9 were collected between 10 and 14 days after the meals were eaten. As everyone had given thought to the food possibly responsible, the data are believed to be reasonably reliable. For comparison of food selection a group identical with the cases in number, occupation, and meals consumed was used. The striking finding was the lack of any evidence to incriminate some one food.

TABLE 9.—*Foods selected from the dinner menus by 91 cases and an equal number of controls*

Date	Foods	Number selecting the various foods and beverages	
		Cases	Healthy controls
June 19	Mushroom and barley soup	36	24
	Tomato stuffed with macaroni and cheese	19	23
	Cold roast beef, pickle, and potato chips	58	59
	Peach and nut salad	63	66
	Romaine salad with Russian dressing	9	12
	Cocoanut marshmallow squares	14	19
	Watermelon	66	57
	Milk	15	30
	Iced tea	77	62
	Hot tea	5	4
	Bread and butter	38	54
June 20	Puree split pea	27	24
	Chili con carne	25	21
	Tuna fish salad, relish, and baked potato	63	65
	Orange and cocoanut salad	51	42
	Cucumber salad	33	32
	Chocolate pudding	36	39
	Fresh pineapple	51	46
	Milk	21	29
	Iced tea	72	65
	Hot tea	6	3
	Bread and butter	37	57

In view of the variation of incidence among those served from the same menu in the four dining rooms in the nurses' home, we sought to determine significant variations in the food selection. We did find that the help and nurse aides used salads and iced tea less frequently than the nurses, and meats and milk more commonly. However,

the head nurses and supervisors, who had relatively low case rates, selected foods similar in variety to those used by students and general duty nurses who ate in the cafeteria.

We found only one article of diet which varied in distribution as did the case incidence. This was the salad dressing, which was both mixed with certain of the salads and also available for serving with them. For the latter purpose in the cafeteria the dressing was put on the counter in a big mixing bowl with a large serving spoon. It was difficult to obtain anything but a generous portion and the average volume used per person was known to be relatively large. In contrast, at each of the small tables for the head nurses and supervisors there was a small bowl of salad dressing, and for serving it, a teaspoon. As a result this group tended to use dressing sparingly. The nurse aides and kitchen help rarely ate salads and used little of the dressing. One of the salads is known to have been selected on Tuesday noon by all but six of those who became ill and all or most of these used extra salad dressing. Three lots of the dressing made according to the same recipe, with known minor variations particularly in acidity, were examined. In two of these the organism believed responsible for the outbreak did not multiply, but in one the Newcastle organism grew freely.

The cases tend to conform to the picture of an explosive food-borne infection, but the carriers cannot all be so explained. The evidence indicates that two carriers acquired their infection by direct contact, a special nurse who entered duty June 23 to care for the sick students and the laundress above mentioned. It is suspected that through the close contacts in the nurses' and employees' dormitories, others may have been similarly infected. In this manner the two carriers in the private pavilion may be explained.

The delay in the initiation of the laboratory examinations diminished the reliability of the bacteriological search for the carrier who probably had contaminated the food. These examinations were conducted chiefly during the second week after the infection is believed to have been disseminated. Any mild case or an asymptomatic carrier would have had an adequate opportunity to become negative before being examined. The dietitian serving in the nurses' home and also eating there was found to be a carrier and did have an agglutination titer of 1:40 which was above that of most of the other carriers. This is the only evidence to suggest that she may have harbored the organisms longer than the 8 days from the date of probable spread of the infection to her first and only positive culture. If this is so there is a remote possibility that she might have contaminated the food.

COMMENT

From a study of isolated endemic infections it is difficult to prove the pathogenicity of a newly recognized organism. Our observations in this outbreak establish beyond question that the "Newcastle dysentery bacillus" is pathogenic.

The cultural findings in this study have again demonstrated that a bacteriological procedure reasonably satisfactory as a clinical diagnostic test may be inadequate for the collection of reliable epidemiological observations. In clinical disease the infection is likely to be massive but in carrier states the organisms may be present in small numbers only. Under the latter circumstances a large inoculum must be used to discover the suspected agents. Effective epidemiological study of the enteric infections requires the use of some culture medium which will both inhibit the common nonpathogenic enteric organisms, thus permitting the use of a heavy inoculum, and favor the growth of the suspected pathogens. For *Shigella dysenteriae* the desoxycholate citrate agar has been found to be superior to other media previously available. The defect of this preparation is that it does inhibit in varying degrees certain of the pathogens, including the "Newcastle dysentery bacillus." Despite this known imperfection, this selective medium was markedly superior to ordinary nonselective preparations in the detection of carriers. How much different the observations would have been if a better selective medium had been available is a matter of speculation.

In the study of the acute diarrheal disorders particular attention must be given to the healthy persons possibly exposed. In infections due to *Entameba histolytica* the carriers usually outnumber the clinical cases. Carriers of *Shigella dysenteriae* are also relatively frequent but probably often escape detection. It is obvious that the presence of any substantial number of undetected carriers may obscure an epidemiological picture.

SUMMARY

1. An explosive outbreak of 97 cases of bacillary dysentery occurred in a hospital in New York City and involved nurses chiefly.

2. The Newcastle dysentery bacillus was isolated from 79.4 percent of the cases.

3. Twenty-three carriers were found.

4. The constitutional symptoms were more severe than in infections with *Shigella dysenteriae* Flexner and *Shigella dysenteriae* Sonne.

5. The coli-inhibiting medium, desoxycholate citrate agar, was found to be of superior value in the isolation of the organism, particularly from carriers.

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6. The sera of cases and carriers contained agglutinins for the "Newcastle dysentery bacillus" in amounts well above that observed in control sera. Complete agglutination was obtained in a maximum titer of 1:320.

7. The infection was evidently spread by food contaminated by an undetected carrier in the kitchen of the nurses' home.

8. The responsible item of food could not be identified with certainty but the evidence tended to incriminate salad dressing.

9. This outbreak firmly establishes the pathogenicity of this recently described organism.

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EXPERIMENTAL PRODUCTION OF AGGLUTININS FOR *TRYPANOSOMA CRUZI*[1]

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Although *Trypanosoma cruzi* infection in man and in animals has been known since 1907 (*1, 10*), up to the beginning of the present study (1933) no one has utilized the culture of *Trypanosoma cruzi* as a means of diagnosing the disease (*7, 8, 10, 11*). Such a study was undertaken by the writer, and a brief summary of the agglutination and precipitation tests for diagnosis of *Tr. cruzi* infection was published during 1935 (*7*). The object of the present paper is to give a detailed description of the technique of the macroscopic agglutination test and the results obtained by such procedure.

Guerreiro and Machado (*2*) in 1913 used the complement fixation test for diagnosing Chagas' disease. They considered their antigen, which consisted of a glycerine and aqueous extract of heart and spleen of infected animals (puppies), as being specific. The complement fixation test for this disease has been used also by others who consider the reaction specific and of diagnostic significance (*3, 4, 9*).

[1] A part of this study was performed at the Department of Bacteriology and Immunology, Washington University Medical School, St. Louis, Mo., during the academic year 1933-34. The writer is indebted to the members of the Department of Bacteriology and Immunology of Washington University for their kind interest in this work.

METHODS AND MATERIALS

Trypanosoma cruzi.—Three strains of *Tr. cruzi* were used during this study. The first strain, No. 1, was derived from infected *Triatoma genticulata* sent from Panama by Dr. H. Clark.[2] One of the infected *Triatoma* was crushed and inoculated into a guinea pig which contracted the disease. From this animal *Tr. cruzi* was cultured (*6*) on Novy and MacNeal's medium (*5*) on July 20, 1932, at the Medical School, University of Michigan, and has been maintained *in vitro* up to the time of writing (May 1940). It grew luxuriantly and colonized. In spite of its being *in vitro* nearly 8 years it still produces infection in susceptible animals. The second strain, No. 8, was cultured by the writer at Washington University Medical School, St. Louis, Mo., during 1933, from an infected *Triatoma protracta* sent by Professor Charles Kofoid from California. The third strain, No. 4, was isolated from *Triatoma megista* at the National Institute of Health. This strain was sent to the writer by the late Dr. C. Chagas who had isolated it originally from a human case in Brazil during 1936.

Preparation of the Tr. cruzi antigen for immunization and agglutination tests.—*Tr. cruzi* was grown from 1 to 3 weeks on blood agar slants at room temperature or at 25° C. Defibrinated rabbit blood was used exclusively for preparing the culture medium. The tubes were all sealed, either with rubber caps, rubber stoppers, or sealing wax. When sufficient growth was obtained, usually the second week after inoculation, several tubes (from 4 to 100, depending upon the requirements of the particular experiment) were selected. The growth on each tube was freed and suspended in Tyrode solution. This was transferred to sterile test tubes or flasks containing glass beads. After shaking, it was transferred to 15 or 50 cc. centrifuge tubes and centrifuged first at low speed for 5 to 10 minutes to remove coarse particles. The supernatant fluid was transferred into other centrifuge tubes and recentrifuged at high speed (about 3,200 r. p. m.) for 1 hour; the supernatant fluid was this time discarded, and the sediment, trypanosomes, resuspended in Tyrode solution. This last process was repeated three or four times. After the centrifugal washing the supernatant fluid was discarded and the washed trypanosomes were resuspended in Tyrode solution. The thickness of the suspension was the same as that of a 48-hour heavy growth of *B. typhosus* in broth. Each cubic centimeter of the suspension contained about two million trypanosomes.

Immunization of animals.—For immunization of rabbits and a rooster, 30 cc. of a heavy suspension of *Tr. cruzi* were prepared as outlined above. The preparation was killed by adding 0.04 percent of

[2] The writer is indebted to Professor William Taliaferro of the University of Chicago for bringing him this material from Panama.

TABLE 1.—*Determination of agglutination titer of anti-Trypanosoma cruzi serum*

Experimental animal	Dilutions and degree of agglutination																	
	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096	1:8192	1:16384	1:32768	1:65536	1:131,072	1:262,144	1:524,288 1:1,048,576
Rabbit No. 1:																		
(a) Before inoculation	0	0	0	0	0	0	0	0	0	0	0	0	----	----	----	----	----	----
(b) Immunization period 43 days. During this period rabbit was inoculated intervenously 7 times with formalinized antigen and 8 times with live suspensions of *Tr. cruzi* (Panama strain No. 1).	+++	+++	±	0	++++	++++	++++	++++	++++	++++	+	0	----	----	----	----	----	----
(c) Immunization period 59 days. During this period rabbit was inoculated intravenously 7 times with formalinized antigen and 11 times with living antigen of *Tr. cruzi* (Panama strain No. 1.)	+++	+++	+	+	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	0	
Rabbit No. 2:																		
(a) Before inoculation	±	0	0	0	0	0	0	0	0	0	0	0						
(b) Immunization period 43 days. During this period rabbit was inoculated intraperitoneally 7 times with formalinized antigen and 8 times with living antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	±	±	+++	++++	++++	++++	++++	++	0	0						

(c) Immunization period 59 days. During this period rabbit was inoculated intraperitoneally 7 times with formalinized antigen and 11 times with living antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	+	+	++++	++++	++++	++++	++++	++++	++++	++	+	+	0	0	0	0 0
Rabbit No. 3:																		
(a) Before inoculation	0	0	0	0	0	0	0	0	0	0	0	0						
(b) Immunization period 24 days. During this period rabbit was inoculated intervenously 9 times with formalinized antigen of *Tr. cruzi* (Brazilian strain No. 6).	0	0	+	+	+++	+++	+++	++++	++++	±	0	0	0	0	0	0	0	0 0
(c) Immunization period 35 days. During this period rabbit was inoculated intervenously 9 times with formalinized antigen and 7 times with live antigen of *Tr. cruzi* (Brazilian strain No. 6).	+++	+++	++	++	++++	++++	++++	++++	++++	++++	+	+	0	0	0	0	0	0 0
Rooster No. 1:																		
(a) Before inoculation	+	+	+	0	0	0	0	0	0	0	0	0						
(b) Immunization period 43 days. During this period the rooster was inoculated intervenously 7 times with formalinized antigen and 8 times with live antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	++++	++++	++++	++++	++++	++++	++++	++++	+++	++++	+++	±	0	0	0	0 0
(c) Immunization period 49 days. During this period the rooster was inoculated intervenously 7 times with formalinized antigen and 11 times with live antigen of *Tr. cruzi* (Panama strain No. 1).	+++	++++	++++	++++	++++	++++	++++	++++	++++	++	0	0	0	0	0	0	0	0 0

TABLE 2.—*Agglutination tests of homologous and heterologous sera against monovalent Trypanosoma cruzi antigen (Panama strain)*

Experimental animals		Duration of infection in days	Dilution of serum and degree of agglutination									
Inoculated with	Species		1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1,024	1:2,048
Tr. cruzi, Panama strain	Rabbit No. 7	82	++++	++++	++++	++++	++++	++++	++++	++	±	0
Tr. cruzi, California strain	Rabbit No. 8	82	++++	++++	++++	++++	++++	++++	++++	±	0	0
Tr. cruzi, Panama strain	Rabbit No. 9	76	−	±	++	++++	++++	++++	++++	++++	++	0
Tr. cruzi, Panama strain	Rabbit No. 10	76	±	++	++++	++++	++++	++++	++++	0	0	0
Tr. cruzi, California strain	Rabbit No. 11	119	----	----	++++	++++	++++	++++	++++	++++	0	±
Tr. cruzi, Brazilian strain	Rabbit No. 12	119	----	----	++++	++++	++++	++++	++++	++++	0	0
Tr. cruzi, Panama strain	Guinea pig No. 1	54	++++	++++	++++	++++	++++	++++	++++	++++	0	0
Tr. cruzi, California strain	Guinea pig No. 2	54	++++	++++	++++	++	0	0	0	0	0	0
Tr. brucei	Rabbit No. 13	22	++++	++++	++	0	0	0	0	0	0	0
Tr. hippicum	Rabbit No. 14	80	++++	++++	0	0	0	0	0	0	0	0
Normal serum, negative control	Rabbit No. 15	----	±	0	0	0	0	0	0	0	0	0
Anti-*Trypanosoma cruzi* serum, positive control, Panama strain	Rabbit No. 1	----	++++	++++	+	+	++++	++++	++++	++++	++++	++++

formalin. The antigen was tested for sterility by the cultural method and by inoculation into mice. The stock was divided into several tubes, sealed, and kept on ice at 4° C. All animals used were bled and the serum removed for the control agglutination test. The test being negative, they were injected with 1 cc. of *Tr. cruzi* antigen every 2 or 3 days until 7 or 9 injections had been made. One rabbit was injected intraperitoneally, the other 5 rabbits and the rooster intravenously. The agglutination titer was determined at various intervals. After the agglutination titer had reached about 1:1,000, the subsequent 18 to 24 inoculations were made once or twice in a week with living *Tr. cruzi* suspensions. The suspensions were made as outlined above but no formalin was added. Serum was obtained from the animals at intervals, and the agglutination titers were determined. (See table 1.)

The positive agglutination reaction was manifested first with macroscopic clumpings or granular appearance of the entire suspension in the test tube which was followed by heavy sedimentation leaving more or less clear, supernatant fluid. The negative tubes remained uniformly turbid throughout the experiment.

Agglutination tests.—Serum was diluted with Tyrode solution. Each serological tube contained 0.5 cc. of the diluted serum to which an equal quantity of freshly prepared live *Tr. cruzi* suspension was added. The antigen consisted of washed live *Tr. cruzi* suspended in Tyrode solution. The suspension contained over 2,000,000 trypanosomes per cc. (about the same turbidity as *B. typhosus* antigen). Utmost care was taken to have an even suspension and to eliminate all clumps. Antigen prepared by such a procedure always gives a definite macroscopic agglutination reaction with positive control serum. The proper control tubes were also made. The tubes were shaken and left at room temperature at water bath or at 37° C. for 30 minutes. At the end of this period the reading was made. Readings were also taken after 1 hour and the following day, and in some cases after a week, and no significant change was found in agglutination titer as compared with the first reading. As a rule, these tests were performed under aseptic precautions.

EXPERIMENTAL FINDINGS

The present study demonstrated that all the animals which were experimentally immunized with *Tr. cruzi* produced specific antibodies, and that the agglutination titer gradually increased, in the case of rabbits, in dilution as high as 1:262,144. Table 1 is representative of many preliminary and final agglutination reactions obtained during the progress of this work.

Rabbits Nos. 1 and 2 and the rooster were immunized with the Panama strain of *Tr. cruzi*. Rabbit No. 1, which received all inocula-

tions intravenously, showed a much higher agglutination titer than Rabbit No. 2, which received a similar amount of antigen intraperitoneally. The prozone usually was present in both. In rabbits No. 1 and No. 2 no drop in agglutination titer was ever noted during the period of immunization. A few weeks following discontinuance of antigen inoculations, the agglutination titer was slightly lowered, but by subsequent inoculations with living antigen of *Tr. cruzi* the agglutination titer of the serum was raised to the former level, and in one instance even higher, showing anamnestic reaction. The agglutination titer for rabbit No. 2 increased but never reached the same height as that for rabbit No. 1. (See table 1.)

Both rabbits used for production of *Tr. cruzi* antiserum appeared healthy during and after the experiments, and continually gained weight. At various intervals cultures were made to see if any of the inoculated trypanosomes were surviving in the blood of the animals, but in no case was a positive culture obtained.

The rooster gave the higher agglutination titer during the earlier period of immunization. However, the agglutination titer never exceeded 1:20,000. It is striking to note that after reaching this height, the titer dropped to as low as 1:2,408, while the fowl was repeatedly inoculated once or twice a week. At this stage of falling titer the animal appeared sick, and antigen inoculations were suspended for 3 weeks. At the end of this period further doses of antigen were given to see whether an anamnestic reaction could be produced, but no rise of agglutination titer was obtained. The rooster was very sick and further inoculations were discontinued. This particular fowl developed paralysis and was killed and all the serum was removed. Samples of the blood obtained at various intervals and placed in Novy and MacNeal's (*5*) medium were always sterile for *Tr. cruzi*. Six normal chickens had a very low agglutination titer, never exceeding 1:20, while in chicks 2 days old the titer was 1:2.

Rabbits Nos. 3, 4, 5, and 6 were inoculated intravenously with the Brazilian strain of *Tr. cruzi* (No. 4). The first 9 inoculations each consisted of 1 cc. of formalinized antigen of *Tr. cruzi*, and were given every second day. Six days from the last inoculation, blood serum obtained from these rabbits agglutinated with homologous strain of *Tr. cruzi* in dilution up to 1:1,024. The following 7 inoculations consisted of living antigen of *Tr. cruzi* given during 35 days, from 2 to 7 days apart. The agglutination titer at the end of that period rose to dulution 1:2,048. Because of the uniformity of the agglutination tests in these four rabbits, only the results obtained with rabbit No. 3 are presented in table 1.

Rabbits Nos. 7 to 12 were inoculated directly with living infective cultures of *Tr. cruzi*—2 rabbits with Panama strains, 2 with Cali-

fornia strains, and 2 with Brazilian strains of *Tr. cruzi*. Samples of serums removed from these animals during 30 to 162 days of illness gave positive agglutination reactions with *Tr. cruzi* antiserums (Panama strain); the agglutination titers ranged from 1:256 to 1:1,024.

Similarly, 2 guinea pigs were inoculated with infective cultures of *Tr. cruzi*, one with the Panama strain and the other with the California strain. Trypanosomes were demonstrated in the blood of these animals at various intervals and recultured. The agglutination titer reached about 1:512 during 54 days (see table 2).

One rabbit, No. 13, infected with *Tr. brucei* (nagana), and another rabbit, No. 14, infected with *Tr. hippicum* (murrina), were bled, the first on the twenty-second day of illness and the second after 80 days of illness; serum samples were subjected to agglutination tests, using *Tr. cruzi* as antigen. The highest agglutination titer obtained with these serum samples was 1:32 (see table 2).

SUMMARY

1. *Trypanosoma cruzi* on the medium of Novy and MacNeal grew luxuriantly and formed colonies. From such cultures desired amounts of microorganisms were removed and used for serological and immunological studies.

2. Anti-*cruzi* serum with a titer of over 1:260,000 was obtained in one instance by the injection of rabbits with washed trypanosome cultures. The first 7 injections consisted of formalinized antigen while the subsequent injections (10 to 30) were live suspensions of washed *Tr. cruzi*.

3. *Tr. cruzi* antigen (culture) was agglutinated by the serum samples from animals infected with *Tr. cruzi* in dilutions of 1:256 to 1:1,024, but with the sera of animals infected with nagana or murrina, the maximum titer of agglutination was 1:32.

4. The California strain of *Tr. cruzi* (cultured from *Triatoma protracta*) agglutinated with the anti-trypanosome sera of the Panama strain (cultured from *Triatoma genticulata*) in very high dilutions.

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HIGHLY VIRULENT STRAINS OF ROCKY MOUNTAIN SPOTTED FEVER VIRUS ISOLATED FROM TICKS (*D. VARIABILIS*) IN GEORGIA [1]

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The presence of typical scrotal lesions, a shorter average incubation period, and a high fatality rate among the guinea pigs inoculated with strains of Rocky Mountain spotted fever virus recovered in western United States has served in the past to distinguish these strains from those isolated in the eastern part of the country. Recently Topping and Dyer (*1*) reported the recovery of a highly virulent strain from a human patient in the East. Their strain regularly exhibited the scrotal lesions, short incubation period, and high fatality associated with the western strains.

We wish to report the recovery of two strains of this infectious agent from ticks (*D. variabilis*) in Georgia.[2] These strains regularly exhibited the scrotal lesions and short incubation period observed in the western strains of Rocky Mountain spotted fever.

In the summer of 1939, one adult male tick (*D. variabilis*) was submitted to this laboratory. It had been removed from a dog whose owner was suffering from a typical attack of Rocky Mountain spotted fever. Later 4 ticks, 2 engorged adult females and 2 adult males (*D. variabilis*), were taken from a neighbor's dog and sent to us for study. Guinea pigs were inoculated intraperitoneally with emulsions of the ticks, and the infectious agent was isolated in each case. Both strains were maintained in serial passage until their identity was established. One was then dropped and the other kept for further study. This latter strain has been maintained by serial passage in guinea pigs in this laboratory to date.

Involvement of the scrotum was noticed in the second group of passage guinea pigs and has been observed in all subsequent passages. This is apparently identical with that observed in animals inoculated with the western strains. It appears a few days after the onset of fever as a diffuse erythema followed by a macular rash which becomes purpuric within 24 hours. There is a slight edema of the cutaneous structures. The lesions may stop at this point or progress to the stage of necrosis and sloughing of the superficial layers of the skin. Healing usually begins before the slough is complete and progresses from both the bottom and sides of the ulcer. Characteristic scarring results.

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[1] From the Typhus Research Laboratory, Albany, Ga., Division of Infectious Diseases, National Institute of Health.

[2] The ticks were submitted by the health commissioner of DeKalb County and the Georgia State Department of Health.

The strains isolated were shown to be Rocky Mountain spotted fever virus by the clinical picture in guinea pigs and by cross immunity tests with both a typical western and eastern strain of Rocky Mountain spotted fever. No cross immunity existed between the Georgia strains and several strains of endemic typhus fever. Histological examination of the brains of several infected guinea pigs was made by Dr. R. D. Lillie, who reported the typical lesions associated with Rocky Mountain spotted fever.

The clinical picture of routine passage animals used in the maintenance of the Bitterroot strain and our tick strain is summarized in table 1.

TABLE 1

Strain	Where isolated	Number of guinea pigs	Average incubation period, days [1]	Scrotal reaction	Fatality	
					Number	Percent
Tick	Georgia	52	3.54	49	30	57
Bitterroot	Montana	22	3.56	22	16	73

[1] In both strains the minimum incubation period was 2 days and the maximum 5 days, with the exception of one animal inoculated with the tick (Georgia) strain. This guinea pig showed a rise in temperature on the seventh day after inoculation.

Table 2 is a summary of the clinical findings in 2 groups of 12 male (500-gram) guinea pigs each inoculated on the same day with the designated strain.

TABLE 2

Strain	Where isolated	Number of guinea pigs	Average incubation period, days	Scrotal reaction	Fatality	
					Number	Percent
Tick	Georgia	12	3.75	12	6	50
Bitterroot	Montana	12	3.58	12	10	83

There is no real difference in the results shown in the two tables and they bring out quite clearly the similarity of the two strains. The average incubation period for the two strains is almost identical and only an occasional animal failed to exhibit a definite scrotal reaction. There was a difference in the fatality rate, that of the Bitterroot strain being distinctly higher than that observed in the tick (Georgia) strain.

SUMMARY

Isolation of two strains of Rocky Mountain spotted fever virus from ticks (*D. variabilis*) in Georgia is reported. These strains are compared with the Bitterroot strain from Montana and points of similarity and difference noted.

REFERENCE

(1) Topping, Norman H., and Dyer, R. E.: A highly virulent strain of Rocky Mountain spotted fever virus isolated in the eastern United States. Pub. Health Rep., **55**: 728 (April 26, 1940).

DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, SECOND QUARTER AND FIRST HALF OF 1940, WITH A NOTE ON THE OCCURRENCE OF BRONCHITIS, PNEUMONIA, AND APPENDICITIS, 1931–40 [1]

By WILLIAM M. GAFAFER, *Senior Statistician, United States Public Health Service*

The data presented in this paper are derived from periodic reports on sickness and nonindustrial injuries causing disability lasting more than one week among approximately 195,000 male members of 26 industrial sick benefit associations, group insurance plans, and company relief departments.

Second quarter and first half of 1940.—Table 1 shows the frequency of disabilities among male industrial workers for the second quarter and first half of 1940. It will be noted that the number of workers exposed shows an increase from about 170,000 in the second quarter of 1939 to almost 195,000 in the corresponding quarter of 1940. This change reflects principally the increase in the number of iron and steel workers. The statement has frequently been made that large increases in the number of exposed workers probably effect increases in the sickness and injury rates (for example, references *2* and *3*), a thought that will be explored in a later report of this series when more data will have become available.

Attention is directed to the favorable frequencies, both for the second quarter and the first half of the year, shown by tuberculosis of the respiratory system and infectious and parasitic diseases. The rates for the second quarters of 1940 and 1939 show sensible increases for bronchitis, acute and chronic, and appendicitis, while the rates for the second halves show increases for the same causes and, in addition, for pneumonia, all forms.

Bronchitis, pneumonia, and appendicitis, 1931–40.—The increases observed for bronchitis, pneumonia, and appendicitis raise the question of their frequency during preceding years. Table 2 presents the frequencies for the first halves of the years 1931–40; each frequency is also expressed in terms of its relation to the corresponding rate for the entire period of 10 first-half years.

It is seen from the table that: (1) The trends of the frequencies over the 10-year period are upward and increase at approximately the same rate; (2) from 1931 through 1935 the frequencies are in general less than, and after 1935 greater than, the corresponding frequencies for the 10 years; (3) the greatest excess was shown in the first half of 1940; and (4) the largest defect occurred during the first half of 1933. Furthermore, a graphic presentation of the time changes in the fre-

[1] From the Division of Industrial Hygiene, National Institute of Health. For the first quarter of 1940 see reference (*1*).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by cause, the second quarter of 1940 compared with the second quarter of 1939, and the first half of 1940 compared with the first halves of the years 1935–39, inclusive* [1]

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 males				
	Second quarter		First half		
	1940	1939	1940	1939	1935–39
Sickness and nonindustrial injuries [2]	86.3	83.7	110.7	104.4	101.3
Nonindustrial injuries (163–198)	10.2	9.7	11.4	9.7	10.4
Sickness [2]	76.1	74.0	99.3	94.7	90.9
Respiratory diseases	30.8	30.1	50.5	47.8	43.3
Influenza and grippe (33)	12.0	13.1	25.8	26.4	22.8
Bronchitis, acute and chronic (106)	4.1	3.3	6.4	4.9	5.1
Diseases of the pharynx and tonsils (part of 115)	5.7	5.4	6.0	5.5	5.6
Pneumonia, all forms (107–109)	3.5	3.3	4.9	4.0	3.3
Tuberculosis of the respiratory system (13)	.6	.9	.6	.9	.9
Other respiratory diseases (104, 105, 110–114)	4.9	4.1	6.8	6.1	5.6
Nonrespiratory diseases	43.6	41.9	46.8	44.6	45.1
Digestive diseases	14.4	13.4	14.9	13.8	13.6
Diseases of the stomach except cancer (117, 118)	3.7	3.8	3.9	3.7	3.8
Diarrhea and enteritis (120)	1.3	1.0	1.3	1.1	1.0
Appendicitis (121)	5.1	4.0	5.3	4.2	4.3
Hernia (part of 122)	1.7	1.8	1.6	1.6	1.7
Other digestive diseases (part of 115, 116, part of 122, 123–129)	2.6	2.8	2.8	3.2	2.8
Nondigestive diseases	29.2	28.5	31.9	30.8	31.5
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.1	4.3	4.6	4.8	4.3
Other genitourinary diseases (133–138)	2.4	2.1	2.7	2.2	2.4
Neuralgia, neuritis, sciatica (part of 87)	2.6	2.0	2.8	2.2	2.4
Neurasthenia and the like (part of 84)	1.1	1.0	1.1	1.0	1.1
Other diseases of the nervous system (80–83, part of 84, 85, 86, part of 87)	1.0	1.0	1.1	1.0	1.2
Rheumatism, acute and chronic (58, 59)	4.3	3.8	4.4	4.2	4.4
Diseases of the organs of locomotion, except diseases of the joints (part of 156)	2.7	2.3	3.0	2.7	2.9
Diseases of the skin (151–153)	2.1	2.3	2.6	2.5	2.6
Infectious and parasitic diseases [3] (1–12, 14–24, 26–29, 31, 32, 34–44)	1.9	2.3	2.1	2.6	3.1
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, part of 156, 157, 162)	7.0	7.4	7.5	7.6	7.1
Ill-defined and unknown causes (200)	1.7	2.0	2.0	2.3	2.5
Average number of males covered in the record	194,892	171,144	195,604	170,896	162,164
Number of organizations	26	26	26	26	

[1] In 1940 and 1939 the same organizations are included; the rates for the years 1935–39, however, are based on records from the same 26 organizations and some additional reporting organizations.
[2] Exclusive of disability from the venereal diseases and a few numerically unimportant causes of disability.
[3] Except influenza, respiratory tuberculosis, and the venereal diseases.

quencies of the three causes reveals the least variability for appendicitis, and approximately the same variability for each of the other two causes. Moreover the frequencies for pneumonia are consistently lower than those for either bronchitis or appendicitis, bronchitis being higher than appendicitis for all halves with the exception of those for 1933 and 1934.

The frequencies of bronchitis, pneumonia, and appendicitis have also been examined for the second quarters of the same decade. It was found that bronchitis failed to show its highest second-quarter frequency in 1940, but the occurrence of pneumonia and appendicitis, respectively, was sufficiently high in the second quarter of 1940 to yield the maximum second-quarter frequency of the 10-year period for each disease. Table 3 presents the pertinent data on pneumonia and

appendicitis. Since it is well known that iron and steel workers suffer a relatively high pneumonia rate, the workers reported upon have been appropriately classified as shown in the table. It will be noted that the behavior of pneumonia (all industries) and appendicitis is similar to that shown for the same causes in table 2 covering the first halves of these years. With regard to the pneumonia rate for the iron and steel workers, it will be observed that for each year it is consistently higher than the rate for those not employed in the iron and steel industry; at the same time it appears that the time trend of the rates rises more rapidly for workers not employed in the iron and steel industry.

TABLE 2.—*Frequency of disabling cases of bronchitis, pneumonia, and appendicitis lasting 8 consecutive calendar days or longer among MALE employees in various industries, the first halves of 1931–40, inclusive*

Year in first half of which onset of disability occurred	Bronchitis, acute and chronic		Pneumonia, all forms		Appendicitis	
	Annual number of cases per 1,000 males	Ratio to rate for 1931–40	Annual number of cases per 1,000 males	Ratio to rate for 1931–40	Annual number of cases per 1,000 males	Ratio to rate for 1931–40
1931	4.5	0.94	3.1	0.97	3.7	0.90
1932	4.8	1.00	2.3	.72	3.7	.90
1933	2.8	.58	2.1	.66	3.1	.76
1934	3.6	.75	2.4	.75	4.0	.98
1935	4.2	.88	3.0	.94	3.8	.93
1936	6.1	1.27	3.8	1.19	4.3	1.05
1937	5.7	1.19	3.5	1.09	4.6	1.12
1938	4.7	.98	2.5	.78	4.3	1.05
1939	4.9	1.02	4.0	1.25	4.2	1.02
1940	6.4	1.33	4.9	1.53	5.3	1.29
Mean, 1931–40	4.8	1.00	3.2	1.00	4.1	1.00

TABLE 3.—*Frequency of disabling cases of pneumonia and appendicitis lasting 8 consecutive calendar days or longer among MALE employees in various industries, the second quarters of 1931–40, inclusive*

Year in second quarter of which onset of disability occurred	Pneumonia, all forms						Appendicitis	
	Annual number of cases per 1,000 males			Ratio to rate for 1931–40			Annual number of cases per 1,000 males	Ratio to rate for 1931–40
	Iron and steel workers only	All except iron and steel workers	All workers	Iron and steel workers only	All except iron and steel workers	All workers	All workers	All workers
1931	2.7	1.6	2.1	1.00	0.80	0.88	3.5	0.83
1932	1.9	1.6	1.8	.70	.80	.75	4.1	.98
1933	1.9	1.3	1.5	.70	.65	.62	3.2	.76
1934	2.8	1.3	1.9	1.04	.65	.79	4.1	.98
1935	2.3	2.1	2.2	.85	1.05	.92	4.1	.98
1936	3.2	2.2	2.7	1.19	1.10	1.12	4.6	1.10
1937	3.4	1.9	2.7	1.26	.95	1.12	4.7	1.12
1938	1.9	1.8	1.8	.70	.90	.75	4.2	1.00
1939	3.4	3.1	3.3	1.26	1.55	1.38	4.0	.95
1940	3.8	3.0	3.5	1.41	1.50	1.46	5.1	1.21
Mean, 1931–40	2.7	2.0	2.4	1.00	1.00	1.00	4.2	1.00

REFERENCES

(1) Gafafer, W. M.: Disabling morbidity among male and female industrial workers during 1938 and 1939, and among males during the first quarter of 1940, with an inquiry into the occurrence of multiple attacks of disabling sickness and injuries, 1939. Pub. Health Rep., **55**:1402–1406 (August 2, 1940).

(2) U. S. Department of Labor, Bureau of Labor Statistics: Hours, fatigue and health in British munition factories. Bull. No. 221. (Reprints of the memoranda of the British Health of Munition Workers Committee.) United States Government Printing Office (1917). P. 64.

(3) [Gafafer, W. M.]: Sickness among male industrial employees during the third quarter and the first 9 months of 1937. Pub. Health Rep., **53**:37–39 (January 14, 1938). P. 39.

COURT DECISION ON PUBLIC HEALTH

Furnishing of certain articles and services by State board of health to practitioners of the healing art.—(Florida Supreme Court; *State ex rel. Turner* v. *Baltzell et al.*, 197 So.783; decided September 20, 1940.) The State Board of Health of Florida, by rule, provided for the furnishing of specimen containers, biological products, and laboratory services to doctors of medicine, osteopaths, and dental surgeons only, but denied them to doctors of naturopathy. In a proceeding by a duly licensed naturopath there was called into question the discrimination that the rule worked against naturopaths. The supreme court pointed out that naturopathic treatment was authorized in Florida by statute and took the view that naturopaths could not be discriminated against in the manner shown.

DEATHS DURING WEEK ENDED NOVEMBER 2, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 2, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,886	7,684
Average for 3 prior years	7,680	
Total deaths, first 44 weeks of year	365,007	358,754
Deaths under 1 year of age	550	436
Average for 3 prior years	469	
Deaths under 1 year of age, first 44 weeks of year	21,868	21,671
Data from industrial insurance companies:		
Policies in force	64,821,760	66,594,573
Number of death claims	10,433	11,775
Death claims per 1,000 policies in force, annual rate	8.4	9.2
Death claims per 1,000 policies, first 44 weeks of year, annual rate	9.6	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 9, 1940

Summary

For the current week, increased incidence was recorded for diphtheria, measles, and scarlet fever, as compared with the preceding week, while the incidence of measles, poliomyelitis, and whooping cough was considerably above the 5-year (1935–39) median expectancy as well as above last year's figures for the corresponding week. Poliomyelitis, although continuing its seasonal decline, is still 79 percent above the 5-year median, measles is 73 percent above, and whooping cough is about 29 percent above. For 1940 to date, however, the cumulative figures are above the 5-year cumulative medians for only influenza and poliomyelitis.

The incidence of influenza decreased in the two States which reported the largest numbers of cases last week (South Carolina from 331 to 144, and Texas from 271 to 220), and the number of poliomyelitis cases dropped from 330 to 278, with the North Central States still reporting the highest incidence.

Of 44 cases of endemic typhus fever, Georgia and Texas each reported 12, Florida 6, and Alabama 5.

For the current week the Bureau of the Census reports 7,984 deaths in 88 major cities of the United States, as compared with 7,967 for the preceding week and with a 3-year (1937–39) average of 7,745 for the corresponding week.

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Telegraphic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11 1939		Nov. 9, 1940	Nov. 11, 1939	
NEW ENG.												
Maine	1	1	2	3	----	----	106	21	21	0	0	0
New Hampshire	0	0	0	----	----	----	0	4	3	0	0	0
Vermont	0	0	0	----	----	----	3	48	21	0	0	0
Massachusetts	2	7	2	----	----	----	227	105	82	2	1	0
Rhode Island	0	0	0	----	----	----	0	34	4	0	0	0
Connecticut	0	0	3	3	3	3	4	6	23	0	1	0
MID. ATL.												
New York	14	15	22	[1] 6	[1] 7	[1] 8	262	171	139	1	4	6
New Jersey	6	23	16	----	4	6	112	8	12	2	1	1
Pennsylvania	15	27	39	----	----	----	518	31	60	2	4	4
E. NO. CEN.												
Ohio	11	68	68	16	5	5	30	8	14	0	0	2
Indiana	18	15	31	2	6	12	7	7	9	1	0	1
Illinois	34	18	46	1	11	11	218	14	14	0	0	3
Michigan [2]	10	12	15	3	1	1	330	160	41	1	2	1
Wisconsin	1	1	4	21	30	36	285	27	52	1	1	0
W. NO. CEN.												
Minnesota	1	1	12	4	1	----	45	31	31	1	1	0
Iowa	1	19	16	1	----	1	31	6	6	1	0	0
Missouri	10	11	21	----	1	36	26	1	9	0	0	2
North Dakota	7	3	1	1	4	----	0	6	6	0	0	0
South Dakota	3	2	1	----	3	----	2	4	1	0	2	1
Nebraska	0	1	2	----	1	----	5	1	1	0	0	0
Kansas	2	2	12	4	6	2	8	35	4	0	0	0
SO. ATL.												
Delaware	0	0	0	----	----	----	1	0	3	0	0	0
Maryland [2]	16	7	13	3	4	6	3	3	7	0	0	2
Dist. of Col	2	4	7	----	2	2	0	0	2	0	1	1
Virginia [2]	25	90	81	74	114	----	23	7	8	2	2	2
West Virginia [2]	12	17	23	2	12	14	7	8	10	0	2	1
North Carolina [2]	58	141	105	4	2	4	6	74	74	2	0	1
South Carolina [2]	11	23	21	144	239	220	9	5	5	0	2	0
Georgia [2]	13	46	44	31	175	----	4	5	0	0	0	0
Florida [2]	4	6	12	1	2	2	1	4	4	0	0	0
E. SO. CEN.												
Kentucky	8	18	38	7	4	6	51	2	25	3	1	1
Tennessee	14	45	43	25	28	28	30	7	7	1	2	2
Alabama [2]	13	36	37	27	59	59	14	8	1	3	0	2
Mississippi [2]	17	15	24	----	----	----	----	----	----	0	1	1
W. SO. CEN.												
Arkansas	15	35	24	17	16	17	5	1	3	0	1	0
Louisiana [2]	12	13	21	2	11	13	1	0	2	0	3	1
Oklahoma [4]	19	12	12	33	53	25	1	0	3	0	1	1
Texas [2]	28	57	65	220	200	147	38	29	19	1	5	1
MOUNTAIN												
Montana	7	0	0	1	14	5	1	8	8	0	0	0
Idaho	1	0	0	----	----	3	1	5	17	0	1	0
Wyoming	0	1	1	----	----	----	3	15	5	0	0	0
Colorado	3	7	8	7	28	----	20	13	2	0	0	0
New Mexico	0	5	5	1	----	2	19	0	4	0	0	0
Arizona	5	1	2	84	46	43	23	1	2	0	0	0
Utah [2]	0	1	1	15	3	----	2	23	23	0	0	0
Nevada	1	----	----	----	----	----	0	----	----	0	----	----
PACIFIC												
Washington	1	7	4	2	1	1	4	209	24	0	1	0
Oregon	4	0	1	----	7	18	10	11	11	0	0	0
California [2]	16	23	33	22	12	27	21	111	111	1	1	2
Total	441	836	941	787	1,115	867	2,517	1,277	1,454	25	41	67
45 weeks	13,073	19,493	22,885	176,684	159,002	146,905	242,029	357,617	357,617	1,430	1,730	4,531

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939	
NEW ENG.												
Maine	1	0	0	10	4	13	0	0	0	2	1	1
New Hampshire	1	0	0	15	2	2	0	0	0	0	0	0
Vermont	0	1	0	5	1	4	0	0	0	0	1	0
Massachusetts	1	2	2	95	46	123	0	0	0	0	0	3
Rhode Island	0	0	0	6	8	8	0	0	0	0	1	0
Connecticut	0	0	0	15	22	32	0	0	0	0	0	1
MID. ATL.												
New York	7	23	6	173	135	266	0	0	0	9	16	13
New Jersey	5	5	3	80	62	54	0	0	0	0	3	3
Pennsylvania	6	13	4	120	242	242	0	0	0	8	14	14
E. NO. CEN.												
Ohio	23	5	2	124	205	251	0	0	0	4	5	9
Indiana	24	2	2	109	121	121	0	1	3	4	8	3
Illinois	28	2	4	213	248	274	3	0	1	6	7	12
Michigan [2]	30	6	4	140	242	242	0	15	1	1	1	3
Wisconsin	23	5	1	93	116	145	2	3	3	2	0	2
W. NO. CEN.												
Minnesota	12	8	1	66	85	94	0	2	2	0	3	0
Iowa	12	23	3	50	78	78	1	6	6	1	0	3
Missouri	18	1	2	67	39	86	1	0	2	7	2	5
North Dakota	0	0	0	7	24	40	0	0	1	0	1	1
South Dakota	3	4	1	28	32	31	0	1	1	3	1	1
Nebraska	6	0	0	10	15	15	1	1	1	0	0	0
Kansas	7	3	3	58	101	101	0	1	2	3	4	4
SO. ATL.												
Delaware	0	0	0	4	16	10	0	0	0	0	0	0
Maryland [2]	0	0	0	32	35	66	0	0	0	0	4	4
Dist. of Col.	0	0	0	6	14	9	0	0	0	0	4	1
Virginia [2]	13	1	1	36	56	56	0	0	0	12	5	10
West Virginia [2]	13	4	2	31	89	89	0	0	0	3	11	7
North Carolina [2]	1	3	1	131	96	90	0	0	0	2	4	4
South Carolina [2]	0	4	0	21	20	12	0	0	0	0	6	3
Georgia [2]	1	2	2	32	40	30	0	0	0	7	3	4
Florida [2]	1	2	1	1	8	6	0	0	0	5	2	0
E. SO. CEN.												
Kentucky	7	13	1	72	74	84	0	0	0	9	1	8
Tennessee	1	0	0	92	100	71	0	0	0	7	7	8
Alabama [2]	1	1	1	24	47	29	0	0	0	4	4	4
Mississippi [2]	2	0	2	12	14	19	0	0	0	1	4	5
W. SO. CEN.												
Arkansas	1	1	1	9	11	11	1	0	1	5	10	7
Louisiana [2]	7	1	1	11	23	17	1	2	1	7	3	8
Oklahoma [4]	1	2	1	14	14	15	1	1	1	8	8	15
Texas [3]	4	4	4	32	39	71	3	0	1	16	13	22
MOUNTAIN												
Montana	0	0	0	26	33	37	0	0	5	1	0	2
Idaho	4	2	0	19	12	33	0	0	0	2	1	2
Wyoming	2	0	0	7	6	6	0	0	1	0	0	0
Colorado	0	3	0	39	32	41	0	3	3	2	3	1
New Mexico	0	3	0	6	8	15	0	0	0	5	0	8
Arizona	0	0	0	10	1	6	0	0	0	1	0	1
Utah [1]	3	5	0	17	25	25	0	0	0	1	0	0
Nevada	0	------	------	0	------	------	0	------	------	0	------	------
PACIFIC												
Washington	11	1	2	16	71	45	1	0	1	3	4	4
Oregon	0	1	1	15	13	32	3	0	1	0	1	2
California [3]	2	22	11	89	116	180	0	0	1	3	30	14
Total	282	178	155	2,288	2,841	3,207	18	36	79	154	196	270
45 weeks	8,995	6,630	6,630	135,828	136,566	191,424	2,132	9,001	9,001	8,735	11,726	13,124

See footnotes at end of table.

Telegrapic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough	
	Week ended—	
	Nov. 9, 1940	Nov. 11, 1939
NEW ENG.		
Maine	43	44
New Hampshire	1	0
Vermont	27	71
Massachusetts	185	138
Rhode Island	4	21
Connecticut	94	72
MID. ATL.		
New York	450	300
New Jersey	137	89
Pennsylvania	541	279
E. NO. CEN.		
Ohio	213	38
Indiana	13	37
Illinois	155	161
Michigan [2]	256	102
Wisconsin	195	132
W. NO. CEN.		
Minnesota	86	57
Iowa	27	16
Missouri	79	11
North Dakota	16	4
South Dakota	5	6
Nebraska	8	7
Kansas	57	12
SO. ATL.		
Delaware	26	10
Maryland [2]	90	52
District of Columbia	14	7
Virginia [3]	30	59
West Virginia [2]	29	10
North Carolina [3]	134	76
South Carolina [3]	12	9
Georgia [3]	9	8
Florida [3]	5	10
E. SO. CEN.		
Kentucky	59	79
Tennessee	70	65
Alabama [3]	5	12
Mississippi [2]	----	----
W. SO. CEN.		
Arkansas	22	12
Louisiana [3]	6	18
Oklahoma [4]	16	2
Texas [3]	89	45
MOUNTAIN		
Montana	0	4
Idaho	5	0
Wyoming	4	7
Colorado	17	9
New Mexico	7	27
Arizona	9	1
Utah [2]	27	107
Nevada	0	----
PACIFIC		
Washington	37	19
Oregon	12	19
California [2]	265	57
Total	3,591	2,321
45 weeks	142,679	154,703

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 9, 1940, 44 cases as follows: Virginia, 2; North Carolina, 1; South Carolina, 3; Georgia, 12; Florida, 6; Alabama, 5; Louisiana, 2; Texas, 12; California, 1.
[4] Rocky Mountain spotted fever, week ended Nov. 9, 1940, Oklahoma, 1 case.

VENEREAL DISEASES

New Cases Reported for August 1940 [1]

Reports from States

	Syphilis										Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis [2]						
	Primary and secondary	Early latent [3]	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population		Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	214	319	1.82	310	1.06	94	0.32	1,320	4.51		545	1.86	16	0.05
Alaska [4]														
Arizona	26	13	.93	33	.79	9	.22	199	4.76		210	5.02	3	.07
Arkansas	284	294	2.79	489	2.36	40	.19	1,255	6.05		138	.67	13	.06
California	130	348	.76	1,056	1.69	57	.09	1,684	2.69		1,760	2.81	32	.05
Colorado	42		.39	110	1.02	16	.15	168	1.56		65	.60		
Connecticut	17	11	.16	75	.43	18	.10	154	.88		106	.61	1	.01
Delaware	16	16	1.22	40	1.52	3	.11	182	6.92		52	1.98		
District of Columbia								361	5.68		277	4.36	4	.06
Florida	266	334	3.53	710	4.18	58	.34	1,797	10.58		150	.88	10	.06
Georgia		1,455	4.67	644	2.07			2,099	6.74		78	.25	1	.003
Hawaii [4]														
Idaho	16		.32	17	.34	2	.04	38	.76		19	.38		
Illinois	106	353	.58	1,276	1.61	80	.10	1,815	2.29		1,673	2.11	29	.04
Indiana	65	54	.34	207	.59	39	.11	511	1.46		139	.40	2	.01
Iowa	43	64	.42	76	.30	8	.03	204	.80		150	.59		
Kansas	45	35	.43	44	.24	14	.08	194	1.04		113	.61		
Kentucky	103	44	.50	259	.88	8	.03	663	2.24		407	1.38	1	.003
Louisiana	205	3	.97	3	.01			897	4.18		77	.36	10	.05
Maine	15		.17	15	.17	3	.03	33	.38		34	.40		
Maryland	112	42	.91	198	1.18	23	.14	844	5.01		400	2.37	24	.14
Massachusetts	45		.10	239	.54	13	.03	297	.67		366	.83		
Michigan	75	111	.38	287	.59	40	.08	671	1.37		628	1.29	15	.03
Minnesota	28	20	.18	202	.76	13	.05	266	1.00		259	.97	1	.004
Mississippi	229	730	4.70	876	4.29	111	.54	4,703	23.05		2,516	12.33		
Missouri	166	369	1.33	273	.68	19	.05	881	2.19		347	.86	5	.01
Montana	10		.18	19	.35	2	.04	35	.64		30	.55		
Nebraska	15	5	.15	32	.23	3	.02	55	.40		36	.26		
Nevada		5	.49	21	2.06			26	2.55		15	1.47		
New Hampshire	1	1	.04	5	.10			16	.31		5	.10		
New Jersey	106	137	.56	433	.99	45	.10	786	1.80		300	.69	2	.005
New Mexico	20	12	.76	63	1.49	6	.14	102	2.42		57	1.35		
New York	360	470	.64	2,768	2.13	165	.13	3,991	3.07		2,172	1.67	85	.07
North Carolina	237	750	2.80	578	1.64	107	.30	1,672	4.74		173	.49	8	.02
North Dakota	6	3	.13	6	.08	2	.03	32	.45		23	.32		
Ohio	193	228	.62	829	1.23	72	.11	1,322	1.96		153	.23	4	.01
Oklahoma	136	143	1.09	226	.88	29	.11	811	3.16		530	2.06	3	.01
Oregon	37	28	.63	72	.69	3	.03	142	1.37		160	1.54		
Pennsylvania	221	518	.72	707	.69	77	.08	1,561	1.53					
Rhode Island	12	12	.35	96	1.41	5	.07	131	1.92		67	.98		
South Carolina	513	374	4.69	595	3.14	48	.25	1,561	8.25		57	.30		
South Dakota	10	1	.16	6	.09	1	.01	18	.26		16	.23		
Tennessee	276	483	2.60	723	2.47	174	.60	1,663	5.69		371	1.27	9	.03
Texas [4]														
Utah	7	5	.23	42	.80	5	.10	62	1.19		16	.31	1	.02
Vermont	2	7	.23	1	.03	2	.05	12	.31		19	.49		
Virginia	370	373	2.71	716	2.61	57	.21	1,652	6.02		283	1.03		
Washington	81	36	.70	165	.99	12	.07	319	1.91		485	2.90	1	.01
West Virginia	100	125	1.18	170	.89	19	.10	704	3.70		285	1.50		
Wisconsin	16	5	.07	122	.41	8	.03	151	.51		124	.42		
Wyoming	4	6	.42	12	.51	1	.04	28	1.18		35	1.48		
Puerto Rico [4]														
Virgin Islands [4]														
Total	4,981	8,342	1.08	15,846	1.28	1,511	.12	38,088	3.07		15,921	1.28	280	.03

See footnotes at end of table.

Reports from cities of 200,000 population or over

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis					
	Primary and secondary	Early latent	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Akron	15	13	1.02	35	1.27	3	0.11	69	2.51	43	1.56	----	----
Atlanta	----	322	10.72	127	4.23	----	----	449	14.95	61	2.03	----	----
Baltimore	96	20	1.39	138	1.65	3	.04	526	6.30	299	3.58	23	0.28
Birmingham	57	15	2.45	26	.88	13	.44	258	8.77	40	1.36	----	----
Boston	10	----	.13	70	.88	5	.06	95	1.19	135	1.70	----	----
Buffalo	21	----	.35	88	1.46	2	.03	111	1.85	57	.95	----	----
Chicago	75	145	.60	716	1.95	33	.09	969	2.64	1,056	2.88	29	.08
Cincinnati [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Cleveland [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Columbus	9	23	1.02	58	1.85	7	.22	97	3.09	17	.54	----	----
Dallas	39	49	2.90	109	3.59	4	.13	201	6.61	174	5.72	12	.39
Dayton	7	13	.90	53	2.39	2	.09	76	3.43	26	1.17	----	----
Denver	24	9	1.10	78	2.59	9	.30	125	4.15	50	1.66	1	.03
Detroit	77	105	1.00	328	1.81	23	.13	533	2.94	481	2.65	29	.16
Houston	43	88	3.66	135	3.77	22	.61	377	10.52	265	7.39	5	.14
Indianapolis	7	1	.21	5	.13	3	.08	98	2.54	29	.75	----	----
Jersey City	7	6	.40	17	.52	2	.06	32	.99	12	.37	----	----
Kansas City [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Los Angeles	----	191	1.26	453	2.98	22	.14	666	4.38	552	3.63	7	.05
Louisville	9	13	.65	121	3.57	----	----	198	5.84	94	2.77	----	----
Memphis [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Milwaukee	11	----	.17	48	.76	1	.02	66	1.05	29	.46	----	----
Minneapolis	6	5	.22	40	.80	1	.02	52	1.04	57	1.14	1	02
Newark	17	148	3.63	----	----	117	2.58	182	4.01	54	1.19	1	.02
New Orleans [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
New York	360	361	.96	1,780	2.38	111	.15	2,820	3.76	1,658	2.21	90	.12
Oakland [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Omaha	5	4	.40	9	.40	----	----	18	.80	13	.58	----	----
Philadelphia	85	243	1.64	294	1.47	18	.09	640	3.19	----	----	----	----
Pittsburgh [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Portland	9	11	.62	39	1.22	----	----	60	1.87	80	2.50	----	----
Providence	7	5	.46	56	2.16	3	.12	73	2.81	42	1.62	----	----
Rochester	3	----	.09	21	.61	----	----	24	.70	46	1.35	----	----
St. Louis	23	129	1.80	323	3.83	23	.27	502	5.96	224	2.66	5	.06
St. Paul	6	5	.38	27	.94	3	.10	41	1.43	36	1.25	----	----
San Antonio	13	31	1.68	93	3.56	12	.46	161	6.15	79	3.02	1	.04
San Francisco	36	28	.93	125	1.81	5	.07	194	2.82	262	3.80	11	.16
Seattle	18	24	1.08	80	2.07	4	.10	133	3.44	152	3.93	1	.03
Syracuse	1	2	.13	61	2.71	9	.40	73	3.24	10	.44	----	----
Toledo	5	2	.23	52	1.67	4	.13	63	2.03	39	1.25	----	----
Washington	----	----	----	----	----	----	----	361	5.68	277	4.36	4	.06
Total	1,101	2,011	1.12	5,605	2.01	464	.17	10,343	3.63	6,449	2.26	220	.11

[1] Figures preliminary and subject to correction.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 4 years.
[4] No report for current month.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 26, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	182	79	29	328	442	746	4	324	43	877	----
Current week [1]	77	58	15	588	289	553	0	273	30	1,243	----
Maine:											
Portland	0	----	0	0	2	6	0	0	1	2	16
New Hampshire:											
Concord	0	----	0	0	0	0	0	0	0	0	10
Manchester	0	----	0	0	2	2	0	0	0	0	24
Nashua	0	----	0	0	0	1	0	0	0	0	10
Vermont:											
Barre											
Burlington	0	----	0	0	0	3	0	0	0	0	10
Rutland	0	----	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	0	----	0	28	6	15	0	8	0	73	218
Fall River	1	----	1	0	2	2	0	0	0	4	39
Springfield	0	----	0	0	0	3	0	3	0	5	42
Worcester	0	----	0	57	5	2	0	0	0	0	54
Rhode Island:											
Pawtucket	0	----	0	0	0	0	0	0	0	0	20
Providence	0	----	0	0	1	2	0	4	1	3	55
Connecticut:											
Bridgeport	0	----	0	0	0	0	0	0	1	2	25
Hartford	0	----	0	1	3	1	0	0	0	7	36
New Haven	1	----	0	0	1	1	0	0	0	33	35
New York:											
Buffalo	0	----	1	2	7	8	0	4	1	20	148
New York	17	3	2	102	50	49	0	59	1	132	1,408
Rochester	0	1	0	1	1	5	0	1	0	18	68
Syracuse	0	----	0	0	1	3	0	1	0	4	36
New Jersey:											
Camden	0	----	0	28	0	5	0	0	0	1	17
Newark	0	----	0	5	2	19	0	2	0	22	69
Trenton	0	----	0	0	0	0	0	2	0	2	41
Pennsylvania:											
Philadelphia	2	2	0	134	13	22	0	21	1	123	412
Pittsburgh	0	3	3	0	10	5	0	7	0	34	189
Reading	0	----	0	0	0	0	0	0	0	48	24
Ohio:											
Cincinnati	2	----	1	0	4	10	0	4	0	5	127
Cleveland	0	8	1	0	8	19	0	1	0	58	188
Columbus											
Toledo	0	4	4	1	5	4	0	4	0	5	78
Indiana:											
Anderson	0	----	0	0	0	1	0	0	0	0	7
Fort Wayne	0	----	0	0	0	0	0	1	0	1	28
Indianapolis	1	----	2	2	3	11	0	3	5	4	83
Muncie	0	----	0	1	2	0	0	0	0	0	13
South Bend	0	----	0	1	1	0	0	0	0	3	18
Terre Haute	0	----	0	0	0	0	0	0	0	0	17
Illinois:											
Alton	0	----	0	0	1	1	0	0	0	1	6
Chicago	5	2	0	101	19	87	0	40	2	117	668
Elgin	0	----	0	0	0	0	0	1	0	3	11
Moline	0	----	0	0	0	1	0	0	0	0	8
Springfield	0	----	0	0	0	6	0	0	0	12	16
Michigan:											
Detroit	7	----	0	72	7	44	0	12	0	132	245
Flint	0	----	0	1	3	1	0	0	0	7	27
Grand Rapids	0	----	0	0	1	8	0	0	0	49	26
Wisconsin:											
Kenosha	0	----	0	0	0	1	0	0	0	0	9
Madison	0	----	0	----	1	0	0	1	0	7	16
Milwaukee	0	----	0	9	2	28	0	3	0	25	81
Racine	0	----	0	1	0	7	0	1	0	0	11
Superior	0	----	0	3	0	1	0	0	0	0	9

[1] Figures for Barre and Columbus estimated: reports not received.

City reports for week ended October 26, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	----	0	0	0	0	0	0	0	1	15
Minneapolis	0	----	0	1	0	17	0	1	0	12	76
St. Paul	0	----	0	0	1	8	0	0	0	9	59
Iowa:											
Cedar Rapids	0	----	----	0	----	8	0	----	0	0	----
Davenport	0	----	----	0	----	5	0	----	0	0	----
Des Moines	1	----	0	0	0	6	0	0	0	0	27
Sioux City	0	----	----	0	----	3	0	----	0	4	----
Waterloo	1	----	----	0	----	1	0	----	0	0	----
Missouri:											
Kansas City	1	----	0	2	7	6	0	4	1	21	82
St. Joseph	0	----	0	0	2	0	0	0	0	1	32
St. Louis	7	4	0	1	5	18	0	5	2	14	199
North Dakota:											
Fargo	0	----	0	0	0	3	0	0	1	2	----
Grand Forks	0	----	----	0	----	0	0	----	0	1	----
Minot	0	----	0	0	0	0	0	0	1	0	3
South Dakota:											
Aberdeen	0	----	----	0	----	1	0	----	0	2	----
Sioux Falls	0	----	0	0	0	6	0	0	0	0	8
Nebraska:											
Lincoln	0	----	----	1	----	5	0	----	0	1	----
Omaha	0	----	0	0	5	3	0	2	0	1	55
Kansas:											
Lawrence	0	----	0	0	0	0	0	0	0	0	4
Topeka	1	----	0	0	0	4	0	1	0	0	34
Wichita	0	----	0	0	8	3	0	0	0	7	31
Delaware:											
Wilmington	0	----	0	0	2	0	0	0	0	6	39
Maryland:											
Baltimore	1	2	1	0	5	11	0	6	1	76	213
Cumberland	0	----	0	0	3	1	0	0	0	1	13
Frederick	0	----	0	0	0	1	0	0	0	0	4
Dist. of Col.:											
Washington	0	----	0	2	5	8	0	11	0	7	172
Virginia:											
Lynchburg	2	----	0	0	1	1	0	0	0	0	8
Norfolk	1	----	0	0	1	0	0	1	0	3	23
Richmond	0	----	0	0	3	1	0	2	0	3	35
Roanoke	0	----	0	4	1	0	0	0	2	0	19
West Virginia:											
Charleston	0	----	0	0	0	0	0	0	0	1	10
Huntington	0	----	----	0	----	0	0	----	0	0	----
Wheeling	0	----	0	0	3	1	0	0	0	7	16
North Carolina:											
Gastonia	0	----	----	1	----	0	0	----	0	2	----
Raleigh	0	----	0	0	2	0	0	0	0	3	19
Wilmington	1	----	0	0	0	1	0	2	0	0	13
Winston-Salem	1	----	0	1	1	3	0	1	0	10	20
South Carolina:											
Charleston	1	11	0	0	3	2	0	0	1	0	19
Florence	0	1	0	0	0	0	0	0	0	0	7
Greenville	1	----	0	0	1	4	0	0	0	4	18
Georgia:											
Atlanta	0	6	0	0	6	3	0	6	0	1	97
Brunswick	0	----	0	0	2	0	0	0	0	2	5
Savannah	2	3	0	0	1	1	0	2	0	0	33
Florida:											
Miami	0	----	0	0	2	0	0	1	0	0	27
Tampa	0	----	0	0	0	2	0	1	0	1	30
Kentucky:											
Ashland	0	----	0	0	0	0	0	0	0	0	8
Covington	1	----	0	2	0	4	0	1	0	0	13
Lexington	0	----	0	4	0	0	0	1	0	8	14
Tennessee:											
Knoxville	0	----	0	0	0	4	0	0	0	0	21
Memphis	0	----	0	6	2	9	0	5	0	0	65
Nashville	0	----	1	2	2	4	0	4	1	6	59
Alabama:											
Birmingham	3	3	0	2	5	4	0	3	3	2	70
Mobile	1	1	0	0	0	0	0	0	0	0	17
Montgomery	0	----	----	0	----	0	0	----	0	0	----

City reports for week ended October 26, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0			0		1	0		0	0	
Little Rock	0		0	0	14	0	0	2	0	1	20
Louisiana:											
Lake Charles	1		0	0	0	1	0	0	0	0	5
New Orleans	3	1	0	0	14	3	0	7	1	1	145
Shreveport	3		0	0	2	1	0	0	0	0	16
Oklahoma:											
Oklahoma City	1		0	0	4	0	0	0	0	0	35
Tulsa	1		0	0	3	3	0	0	1	1	25
Texas:											
Dallas	3		0	0	1	2	0	1	0	3	61
Fort Worth	0		0	3	3	6	0	2	0	0	30
Galveston	0		0	0	2	0	0	0	0	0	12
Houston	1		0	0	6	2	0	1	0	0	72
San Antonio	0		1	0	4	2	0	5	0	1	57
Montana:											
Billings	0		0	0	1	1	0	0	0	0	14
Great Falls	0		0	0	0	0	0	0	0	0	
Helena	0		0	1	0	2	0	0	0	0	1
Missoula	0		0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0		0	0	1	0	0	0	0	0	6
Colorado:											
Denver	5		0	5	8	6	0	2	0	0	65
Pueblo	0		0	0	2	3	0	1	0	2	13
New Mexico:											
Albuquerque	0		0	0	1	0	0	4	0	0	16
Utah:											
Salt Lake City	0		1	1	3	1	0	1	0	7	34
Washington:											
Seattle	5		0	1	4	1	0	2	3	6	86
Spokane	0		0	0	1	3	0	0	0	0	28
Tacoma	0		0	1	0	3	0	1	0	2	26
Oregon:											
Portland	0		0	0	2	2	0	1	1	0	84
Salem	0		0	0	0	0	0	0	0	1	
California:											
Los Angeles	0	8	0	7	3	23	0	11	0	60	369
Sacramento	0		0	1	7	4	0	0	0	3	38
San Francisco	0		0	2	2	10	0	6	1	21	156

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
New Hampshire:			
Manchester	0	0	1
Rhode Island:			
Providence	0	0	1
Connecticut:			
Bridgeport	0	0	1
New York:			
New York	1	1	1
Syracuse	0	0	4
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Pittsburgh	0	0	2
Ohio:			
Cincinnati	0	0	6
Cleveland	0	0	5
Toledo	0	0	2
Indiana:			
Indianapolis	0	0	1
Muncie	0	0	2
South Bend	0	0	1
Illinois:			
Chicago	0	0	18
Michigan:			
Detroit	0	0	1
Flint	0	0	1
Grand Rapids	1	0	3
Wisconsin:			
Madison	0	0	4
Milwaukee	0	0	2
Racine	0	0	1
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	2
Iowa:			
Des Moines	0	0	1
Waterloo	0	0	1
Missouri:			
Kansas City	0	0	5
St. Joseph	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	1
Kansas:			
Topeka	0	0	1
Virginia:			
Richmond	0	0	1
Roanoke	0	0	3
West Virginia:			
Huntington	0	0	1
North Carolina:			
Winston-Salem	0	0	1
South Carolina:			
Florence	0	1	0
Kentucky:			
Lexington	0	0	1
Alabama:			
Birmingham	0	0	1
Louisiana:			
New Orleans	0	0	3
Shreveport	0	1	3
Texas:			
Fort Worth	0	0	1
Montana:			
Billings	0	0	1
Missoula	0	0	1
Colorado:			
Denver	1	0	1
New Mexico:			
Albuquerque	0	0	1
Washington:			
Seattle	0	0	4
California:			
Los Angeles	0	0	1
Sacramento	1	0	2

Encephalitis.—Cases: New York, 1; Pittsburgh, 1; Sacramento, 2.
Pellagra.—Cases: Boston, 1; Charleston, S. C., 6; Savannah, 6.
Typhus fever.—Cases: New York, 1; Atlanta, 1; Savannah, 7; Miami, 1; Tampa, 1; Birmingham, 1; Mobile, 1; Montgomery, 1; New Orleans, 1; Dallas, 1; Houston, 4.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 12, 1940.—During the week ended October 12, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	2	1		1		1	6
Chickenpox		4	10	48	91	28	17	65	49	312
Diphtheria		9	1	38	2	3	2			55
Dysentery				3	1					4
Influenza		6			51				17	74
Measles	6	1	1	25	87	45	31	50	37	283
Mumps				7	70	18	4	10	17	126
Pneumonia	1				9	1			4	15
Poliomyelitis					9					9
Scarlet fever		1	6	56	73	9	6	15	10	176
Tuberculosis	5	5	8	50	39	2				109
Typhoid and paratyphoid fever			3	23	6				1	33
Whooping cough		24	2	200	110	17	10	53	7	423

VIRGIN ISLANDS (BRITISH)

Vital statistics—Year 1939.—The following table shows the numbers of marriages, births, and deaths in the British Virgin Islands during the year 1939:

Estimated population	6,500
Number of marriages	38
Number of births	226
Births per 1,000 population	19.23
Number of deaths	83
Deaths per 1,000 population	13.55
Deaths under 1 year per 1,000 live births	137.16
Deaths from:	
Cerebral hemorrhage	2
Gastroenteritis	8
Influenza	1
Deaths from—Continued.	
Meningitis	2
Nephritis, acute and chronic	5
Pellagra	1
Pneumonia (broncho)	3
Suicide	1
Syphilis	1
Tetanus, neonatorum	1
Tuberculosis (respiratory system)	8
All other causes	50

YUGOSLAVIA

Communicable diseases—4 weeks ended September 8, 1940.—During the 4 weeks ended September 8, 1940, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	53	5	Poliomyelitis	5	
Cerebrospinal meningitis	64	12	Scarlet fever	168	1
Diphtheria and croup	539	33	Sepsis	9	1
Dysentery	277	15	Tetanus	50	21
Erysipelas	136	2	Typhoid fever	310	17
Favus	3		Typhus fever	9	
Lethargic encephalitis	1	1	Weil's disease	1	
Paratyphoid fever	40				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of October 25, 1940, pages 1973-1976. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Area.—A rat found on October 9, 1940, and another rat found on October 10, 1940, both in Paauhau Area, Hamakua District, Island of Hawaii, Hawaii Territory, have been proved positive for plague.

Yellow Fever

Sudan (French)—Markala Circle—Segou.—On November 3, 1940, 1 suspected case of yellow fever was reported in Segou, Markala Circle, French Sudan.

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